

INFORMATION COMMUNICATION TECHNOLOGIES IN AGRICULTURAL UNIVERSITIES, STATUS AND SCOPE

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ABSTRACT

Information and Communications Technology (ICT) is changing the face of education throughout the globe. The present study was conducted in eighteen colleges of seven Agricultural Universities covering four states in India i.e., Andhra Pradesh, Telangana, Bihar and Jharkhand on accessibility of ICTs, their usage and factors affecting the usage by teachers and students. A total of 1051 students and 254 teachers from 21 colleges of the seven agricultural universities covering four states were selected for the study and the data was collected based on well structured questionnaire. The study revealed that ICT tools like interactive white board (49.38%) and television (35.78%) were the tools mostly used by the students daily, however ICT tools like e-library (37.58%), projector (34.25%) and Computer (36.73%) were used occasionally. In case of teachers, more than fifty percent were not utilizing the ICT tools & Materials like Digital student report card (88.58%), Virtual Classroom (68.50%) and Tele-conference (64.17) whereas tools like computer (86.61 %) and Wi-Fi / LAN (68.90) were used daily by the teachers. The common ICT tools like projectors, televisions, white boards etc., were accessible by more than 80 per cent of students and teachers in all agricultural universities. None of the universities have access to e-portfolio. teachers and students commonly agreed that the trainings on ICTs, availability of e-resources, organizational support and initial time requirement play major role in affecting the usage of ICTs. Most of the teachers opined that the internet speed is the major limiting factor influencing the adoption of ICT tools.

KEYWORDS: Information, Communication, Usage, Agriculture Universities, Students, Teachers & ICT Tools

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INTRODUCTION

Agricultural education imparts knowledge about agriculture, food and natural resources. It is a science enriched with an art, and teaches science including managerial, communications and leadership and imparts wide variety of skills. It is also aimed to develop skilled manpower having added capacity of knowledge in agriculture and overall development in their personality so as to play a vital role in the development of people involved in agricultural sector and more so the society. Agriculture education initially unlike other education systems started with more of practical training besides class room teaching (Land Grant Universities).

Digital literacy has become multi-faceted and it is often found synonymous with e-literacy, screen literacy, multimedia literacy, and information literacy among the few. It is no coincidence that Information and Communication Technology (ICT) tools form the bulwark of this new age digital literacy (Anandaraja *et al.*, 2015). Research studies attribute that ICT in education has binary meanings reflecting both culture (Li, 2004) and technology (Oduwale, 2004).

To achieve the target of SDG4, transformation is needed in education where Information Communication Technologies (ICTs) must be more harnessed to strengthen education systems more so in agricultural education also. As envisaged in the Incheon Declaration and SDG4-Education 2030 Framework for Action, “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”, Information and communication technologies (ICTs) must be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision. The Information and Communication Technology (ICT) is a very broad term focused on improving the quality, quantity and speed of information to reach the students in an educational system and can be one of the effective tools to achieve SDG4 in Education. More so in Higher Education Institutions, with limited infrastructure and manpower, ICT’s can also be used to develop, deliver and share the course content, to facilitate communication among the lecturers, students and administrators, to conduct research and to provide administrative and management services.

Keeping in view of the importance of ICT’s in Agricultural Education, it is thought that a study has to be conducted to know the status of ICT usage in Agricultural Universities and to measure the success of ICT in higher education. This would provide useful information for policy makers, university leaders, administrators and teaching staff to adopt and adapt these innovations in higher agricultural education system. Therefore, the present study was undertaken with the objective to document the status of various ICT tools, to study the factors affecting their adoption and their impact in HEIs.

MATERIAL AND METHODS

The present study was purposively conducted in seven Agricultural Universities covering four States viz., Andhra Pradesh, Telangana, Bihar and Jharkhand. The study involves collection of data through a well structured questionnaire. The data was collected from students and teachers through separate questionnaires. A total of 1051 students and 254 teachers from 21 colleges of the seven agricultural universities covering four states have taken part in the survey. Statistical tools used for analysis of data are frequencies, percentage and mean for interpretation of data.

RESULTS AND DISCUSSIONS

The data pertaining to the accessibility, awareness and factors affecting the usage of ICT resources by the students and teachers is presented and discussed here.

Accessibility & Awareness of ICTs by Students & Teachers

The data regarding availability and awareness of ICT tools and their usage by the students and teachers of four states was presented in the table (1). The common ICT tools computer and projector are accessible to more than 90 per cent of the students. On the other hand, digital student report card system and teleconference is accessible to only 19 per cent of the students. More than 80 percent of the students are having access to common ICT tools like computer and projector. The data clearly shows that, the universities have not taken initiative on the development

of advanced ICT's like Digital student report card and e-portfolio. Other common ICT tools like television and interactive white board are accessible to 68.70 and 79.45 per cent students respectively. The availability of internet is only for 55 per cent students which is highly essential for effective use of ICT's by the students. In all the universities, the common ICT tools are accessible but the key factor, Internet is not available which will hinder the use of ICTs in the system. Moreover, the universities are not travelling with the advancement in ICTs for effective teaching learning management. Bayindir and Inan, 2009 reported that Information and Communication Technologies (ICT's) have become the essential factor for educational development in the current century. Omosewo (2009) also reported that teachers frequently used interactive white board, television, and mobile phone for effective teaching.

All the teachers are having the availability of computer, but none are having e-portfolio. The availability of projector is 94.48% followed by television. The Wi-Fi/LAN is available for 85.82 % of teachers which is highly useful. The availability of tele and video conference is 37.79% and 57.87% respectively and should be improved. Virtual class room availability is only 37.00 per cent while 72.04% of the teachers are having availability of e-library. Even though the availability of computer is 100% but awareness on its use is only with 98 per cent. The awareness on projector/ television and Wi-Fi/LAN is more than 90 per cent with the teachers and the teachers are least aware with e-portfolio (36.22%). Majority of the teachers are also aware about the virtual class room (61.41%) even though its availability is only 37% and same is with tele, video conference facilities. This is also in line with John and Ajibola, 2017 who posits that respondents frequently used interactive white board, television, and mobile phone.

Table 1: Accessibility and Awareness of ICT Tools & Materials by the Students.

S No	ICT Tools and Materials	Students (n=1051)				Teachers (n=254)			
		Accessibility		Awareness		Accessibility		Awareness	
		Accessible	Un-Accessible	Aware	Unaware	Accessible	Un-accessible	Aware	Unaware
1	Interactive White Board	835 (79.45)	216 (20.55)	900 (85.63)	151 (14.37)	155 (61.02)	99 (38.97)	209 (82.28)	45 (17.71)
2	Computer	954 (90.77)	97 (9.23)	973 (92.58)	78 (7.42)	254 (100.00)	0 (0.00)	249 (98.03)	5 (1.96)
3	Projector	948 (90.20)	103 (9.80)	962 (91.53)	89 (8.47)	240 (94.48)	14 (5.51)	247 (97.24)	7 (2.75)
4	Television	722 (68.70)	329 (31.30)	872 (82.97)	179 (17.03)	188 (74.01)	66 (25.98)	242 (95.27)	12 (4.72)
5	Video Conference	283 (26.93)	768 (73.07)	492 (46.81)	559 (53.19)	147 (57.87)	107 (42.12)	215 (84.64)	39 (15.35)
6	Teleconference	176 (16.75)	875 (83.25)	362 (34.44)	689 (65.56)	96 (37.79)	158 (62.20)	178 (70.07)	76 (29.92)
7	E-Portfolio	0 (0.00)	1051 (100.00)	174 (16.56)	877 (83.44)	0 (0.00)	254 (100.00)	92 (36.22)	162 (63.77)
8	Wi-Fi / LAN	585 (55.66)	466 (44.34)	735 (69.93)	316 (30.07)	218 (85.82)	36 (14.17)	233 (91.73)	21 (8.26)
9	Digital Student Report Card	17 (16.18)	1034 (98.38)	335 (31.87)	716 (68.13)	13 (5.12)	241 (94.88)	142 (55.90)	112 (44.09)
10	Virtual Class Rooms	411 (39.10)	640 (60.89)	530 (50.43)	521 (49.57)	94 (37.00)	160 (62.99)	156 (61.41)	98 (38.58)
11	E-Library	649 (61.75)	402 (38.25)	707 (67.27)	344 (32.73)	183 (72.04)	71 (27.95)	218 (85.82)	36 (14.17)
12	University Website	729 (69.36)	322 (30.64)	860 (81.83)	191 (18.17)	228 (89.76)	26 (10.24)	254 (100)	0 (0.00)

The awareness factor also clearly indicates that more than 90 per cent of the students are aware about the television and projector and more than 80 per cent of students are aware about interactive white board and television. The data on the awareness of the students about tele-conference, video conference, virtual class room, e library, e-portfolio and digital student report card system clearly indicate that the students have to be trained in these aspects. If we compare the accessibility and awareness, even though the availability is very less, the students are aware to some extent even on advanced ICTs like e-portfolio and student report card system. The availability of e-library and university website is linked with internet, however the students are well aware about the university web site but awareness is limited on e-library. The awareness on projector/ television and Wi-Fi/LAN is more than 90 per cent with the teachers and the teachers are least aware with e-portfolio (36.22%). Majority of the teachers are also aware about the virtual class room (61.41%) even though its availability is only 37% and same is with tele, video conference facilities. This is also inline with John and Ajibola, 2017 who posits that respondents frequently used interactive white board, television, and mobile phone. Similar observations were corroborated with Ye *et al.*, 2008 and Srinivas *et al.*, 2018 wherein they stated that the usages of ICTs are becoming increasingly relevant for search of information in the pursuit of teaching cum learning.

Usage of ICT Tools by the Students & Teachers

Usage of ICT tools by the students revealed that, e-portfolio (98.57 %) digital student report card (88.68%) and teleconference (84.59%) were not used by most of the students whereas usage of video conference is minimal (table 2). The ICT tools like interactive white board (49.38%) and television (35.78%) were the tools mostly used by the students daily; e-library (37.58%), projector (34.25%) and Computer (36.73%) were used occasionally. Nearly fifty percent of the students were browsing university website (47.00%) occasionally and 60.51 per cent of the students never used virtual classroom. The average ICT utilization by the students in the selected agricultural universities indicated that 50 per cent of the students never used ICT tools during their study.

The usage of ICT tools & materials by the teachers revealed that no teacher is using E-portfolio. More than fifty percent of the teachers were not utilizing the ICT tools & materials like Digital student report card (88.58%), Virtual Classroom (68.50%) and Teleconference (64.17). Tools like computer and Wi-Fi / LAN were daily used by 86.61 and 68.90 per cent of the teachers, respectively. The usage of television (42.91%), e library (44.09%) and interactive white board (27.17 %) was low when compared to computers. The data clearly indicated that the usage of common ICT tools is also not exceeding 50 per cent of students as well as teachers. During recent years with decreased availability of manpower and also to improve the teaching and learning environment use of ICT is highly essential as indicated by Bayindir and Inan, 2009. But in the present study, it is clear that the usage pattern of ICTs by students and teachers should be improved a lot and efforts should be initiated by the administrators in that to improve teaching and learning in the universities.

Table 2: Usage of ICT Tools & Materials by the Students and Teachers.

S No	ICT tools and Materials	Students (n=1051)					Teachers (n=254)				
		Never	Occasionally	Monthly	Weekly	Daily	Never	Occasionally	Monthly	Weekly	Daily
1	Interactive White Board	221 (21.03)	260 (24.74)	12 (1.14)	39 (3.71)	519 (49.38)	107 (42.13)	53 (20.87)	6 (2.36)	19 (7.48)	69 (27.17)
2	Computer	86 (8.18)	386 (36.73)	40 (3.81)	213 (20.27)	326 (31.02)	5 (1.97)	21 (8.27)	5 (1.97)	3 (1.18)	220 (86.61)
3	Projector	138 (13.13)	360 (34.25)	41 (3.90)	189 (17.98)	323 (30.73)	14 (5.51)	78 (30.71)	19 (7.48)	73 (28.74)	70 (27.56)
4	Television	333 (31.68)	235 (22.36)	28 (2.66)	79 (7.52)	376 (35.78)	80 (31.50)	52 (20.47)	2 (0.79)	11 (4.33)	109 (42.91)
5	Video Conference	825 (78.50)	165 (15.70)	21 (2.00)	15 (1.43)	25 (2.38)	121 (47.64)	107 (42.13)	15 (5.91)	5 (1.97)	6 (2.36)
6	Teleconference	888 (84.49)	115 (10.94)	9 (0.86)	12 (1.14)	27 (2.57)	163 (64.17)	72 (28.35)	6 (2.36)	7 (2.76)	6 (2.36)
7	E-Portfolio	1036 (98.57)	9 (0.86)	1 (0.10)	1 (0.10)	4 (0.38)	254 (100.00)	0 (0)	0 (0)	0 (0)	0 (0)
8	Wi-Fi/ LAN	455 (43.29)	246 (23.41)	18 (1.71)	39 (3.71)	293 (27.88)	37 (14.57)	26 (10.24)	2 (0.79)	14 (5.51)	175 (68.90)
9	Digital Student Report Card	932 (88.68)	81 (7.71)	27 (2.57)	4 (0.38)	7 (0.67)	225 (88.58)	8 (3.15)	8 (3.15)	7 (2.76)	6 (2.36)
10	Virtual Class Rooms	636 (60.51)	158 (15.03)	23 (2.19)	48 (4.57)	186 (17.70)	174 (68.50)	41 (16.14)	6 (2.36)	15 (5.91)	18 (7.09)
11	E-Library	395 (37.58)	278 (26.45)	41 (3.90)	136 (12.94)	201 (19.12)	50 (19.69)	55 (21.65)	13 (5.12)	24 (9.45)	112 (44.09)
12	University Website	211 (20.08)	494 (47.00)	93 (8.85)	112 (10.66)	141 (13.42)	61 (24.01)	98 (38.58)	58 (22.83)	22 (8.66)	15 (5.90)

Factors affecting the Usage of ICTs by the Teachers and Students

The data pertaining to factors affecting the use of ICT's by the students were presented in table 3. From the data, it is clear that all the factors are affecting the usage of ICTs above 50 per cent, as opined by the students. Among the nine factors studied, Infrastructure (71.27%) is the key factor most affecting the usage of ICTs by the students followed by initial time requirement (70.50%) while workload (52.90%) is least affecting the usage of ICTs as opined by the students. In addition to these factors, training (65.46%), operational knowledge (69.93%), access to quality ICT (66.98%), internet speed (69.84 %) and availability of e-resources (69.84 %) are some extent influential while using the ICT's by the student.

Table 3: Factors Affecting the Usage of ICT Tools by the Students.

S No	Influencing Factors	Students (n=1051)		
		Disagree	Neutral	Agree
1	Initial time requirement	100 (9.51)	210 (19.98)	741 (70.50)
2	Infrastructure	110 (10.47)	192 (18.27)	749 (71.27)
3	Training	144 (13.70)	219 (20.84)	688 (65.46)
4	Operational knowledge	96 (9.13)	220 (20.93)	735 (69.93)
5	Access to quality ICT	109 (10.37)	238 (22.65)	704 (66.98)
6	Internet Speed	143 (13.61)	174 (16.56)	734 (69.84)
7	Availability of e resources	136 (12.94)	185 (17.60)	730 (69.46)
8	Workload	189 (17.98)	306 (29.12)	556 (52.90)
9	Organizational support	136 (12.94)	261 (24.83)	654 (62.23)

The usage of ICT's by teachers and subsequent incorporation of technology into their teaching and learning is dependent on a number of factors. Such factors include initial time requirement, infrastructure facilities, training, age, operational knowledge, access, internet speed, availability of e-resources, workload, organizational support, funds availability and incentives. The data on the factors affecting the usage of ICT by the teachers in the Agricultural Universities of four states were presented in Table 4. Among all the factors, majority of the teachers agree that (84.64%) internet speed is the first and foremost factor affecting the usage of ICT's by the teachers followed by infrastructure facilities (83.07%). The teachers also opined that age and incentives will play least role in usage of ICTs (58.66% and 50.00%). The teachers also agreed that the trainings on ICTs (79.52%), availability of e-resources (79.52%), organizational support (76.77%) and initial time requirement (75.98%) also play major role in affecting the usage of ICTs.

Table 4: Factors Affecting the Usage of ICT Tools by the Teachers.

S No	Influencing Factors	Teachers (n=254)		
		Disagree	Neutral	Agree
1	Initial time requirement for ICT skill updating	24 (9.4)	37 (14.56)	193 (75.98)
2	Infrastructure facilities	19 (7.48)	24 (9.44)	211 (83.07)
3	Training on ICT tools	20 (7.87)	32 (12.59)	202 (79.52)
4	Age	67 (26.37)	60 (23.62)	127 (50.00)
5	Operational knowledge of ICT tools	31 (12.20)	50 (19.68)	173 (68.11)
6	Access to quality ICT tools	28 (11.02)	31 (12.20)	195 (76.77)
7	Internet Speed	19 (7.48)	20 (7.87)	215 (84.64)
8	Availability of e-resources/ SIS (student information system)	19 (7.48)	33 (12.99)	202 (79.52)
9	Workload	33 (12.99)	52 (20.47)	169 (66.53)
10	Organizational support and Policy	23 (9.05)	36 (14.17)	195 (76.77)
11	Fund availability/ Budget	17 (6.69)	33 (12.99)	204 (80.31)
12	Incentives	49 (19.29)	56 (22.04)	149 (58.66)

Manson, 2000; Lau & Sim, 2008 also opined the same. In most of the cases, the shortcomings result in lack of confidence among teachers in utilizing ICT in curriculum delivery (Tella *et al.*, 2007). Slaouti and Barton (2007) have also shown that hurdles such as access to equipment, time pressures, lack of mentors and opportunities for apprenticeship have an impact on educators' ability to utilize ICT in teaching and learning.

CONCLUSIONS

The paper reflects on the status of ICT s, usage and factors affecting the usage of ICTs in some of the Agricultural universities in southern India. The status of ICT's indicated that the common ICT tools are accessible in all the study area for teachers and students except advanced ICT tools like virtual class rooms, video conference, student report card system, e-library, using computers daily and fifty per cent of teachers are not using the interactive white board, projector, e library, video conference etc. Internet speed is playing a major limiting factor affecting the usage of ICT tools and the respondents

agreed that training on the usage of ICT, availability, organizational support are also playing major role in limiting the usage of ICT tools by both teachers and students.

Based on the finding of the study the following recommendations are made to improve the usage of ICTs

- Provision of adequate budget and proper planning in securing the ICT tools.
- Proper planning in the universities for increasing the accessibility of the ICT tools for both students and teachers.
- Improving the understanding on the advantages in usage of ICTs in education and administration to the policy makers.
- Integration of policy makers, teachers and students in understanding of the usage of ICTs in teaching, learning and administration.
- Adequate capacity building programmes for all the stake holders in the universities on the usage of ICTs in teaching, learning and administration.

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AUTHORS PROFILE



Dr. Thumati Srinivas, has working experience of 26 years and worked in different capacities as a Scientist (Plant Pathology), Coordinator of DAATTCs, Professor (Academic & Educations) in the Administration of the esteemed University i.e. Acharya N. G. Ranga Agricultural University. Involved in the development and release of groundnut varieties Kadiri 5 and Kadiri 6 during 2002 and 2003 from Agricultural Research Station, Kadiri. Kadiri 6 is High yielding, Spanish bunch type, Early having 100-105 days duration and with 48% oil content and occupied 60-80 per cent of groundnut area in Andhra Pradesh, 50-60 per cent of groundnut area in Southern States (AP, Tamilnadu and Karnataka) and 44 per cent groundnut area in India. First time involved in initiation experiments on the usage of botanicals in the management of diseases of groundnut and identified that spraying of 2 per cent aqueous leaf extract of *Calotropis gigantea* at 40 and 70 days after sowing will effectively manage the leaf spot diseases in groundnut. Due to this there will be saving in the cost of management of the disease by 70 per cent.

Published thirty (30) research papers in national and international journals. He has been involved in publication of nearly 60 popular articles in both English and Telugu languages. Handled three externally funded projects funded under ICAR, NABARD etc. Presently, he is handling DBT funded project entitled establishment of Biotech KISAN Hub, ANGRAU with a budget outlay of Rs. 114.30 crores since from 2018. Guided two M.Sc. (Ag.) students. Received several

awards and recognitions for his commitment service and he also bagged the prestigious Padmasri I V Subba Rao Memorial Rythu Nestam Award for the Extension services rendered to the farming Society during the year 2011.



Dr. T. Venkata Sridhar, has 13 years of experience in teaching, research, extension and administration. Taught the soil science and agricultural chemistry courses at both UG (B.Sc. (Ag)) and PG level (M.Sc. (Ag.)) for 3 years. Guided 2 M. Sc. (Ag.) students as Major Advisor and 2 M.Sc (Ag) and 1 Ph.D students as a Minor Advisor. Undertaken 07 Research Projects as Co-PI with funds generated from the Internal and external agencies. Published 30 Research Articles in national and international journals. Presented 11 papers at conferences, seminars, symposia at national and international level. Received University Mandava Meritorious Best Researcher Award for the year 2014.



Dr. P. Punna Rao, has working experience of 26 years in Teaching, Extension, Research and Administration. Secured gold medal in Ph.D (Extension Education). Taught agricultural extension courses at both UG and PG level B.Sc(Ag), M.Sc(Ag), and Ph.D for 9 years. Guided 5 M.Sc(Ag) students as Major Advisor and as a Minor Advisor for 3 M.Sc(Ag) and 3 Ph.D students. Undertaken 12 Research Projects as PI and Co-PI with funds generated from the Internal and external agencies. Published 30 Research Articles in national and international journals. Presented papers in International Conferences / workshops held in Texas, USA (2005), Acra, Ghana(2008) and Penang, Malaysia(2013) . Conceptualized, designed, pilot tested and up scaled the four innovative information delivery models namely Flag method, Developing farmer master trainers, Innovative farmers network and Interactive Information Dissemination System(ICT model) which are facilitating in improved ANGRAU Extension outreach significantly. Received Meritorious Extension Scientist, UgadiPuraskaram and Rythubandhu awards.



Dr. T. Ramesh Babu, was formerly Dean of PG Studies (2 years) and Dean of Faculty of Agriculture (3 ½ years) and retired on 30th September, 2018 as Professor and University Head (Entomology) in ANGRAU contributed significantly towards Academic and Research Excellence as Researcher, Teacher, Extension personnel & as an Administrator. Outstanding benefactions are in the areas of Pesticide Residues, Biological Control of Crop Pests, Post Harvest Entomology and Integrated Pest Management. During the total Professional Experience of 32 ½ years, served as Professor for 17 years. Received four state level awards in all the 3 mandate areas viz., 2 in research (in 1996 and 1998), 1 in

teaching (in 2010) and 1 in extension (in 2012). At National Level, received Gold Medal for outstanding contributions to the science and plant protection (in 2016) and award for the Best Research paper published in Indian Journal of Plant Protection, 2011. Published 164 Research (107 original Research Papers; 18 Research notes; 25 review articles / chapters; 14 Abstracts in conferences / seminar proceedings), 44 information bulletins, edited 2 books and presented two papers at XXII International Congress of Entomology (2004) held in Australia.